

Trend Study 30-46-03

Study site name: Pahcoon Bench.

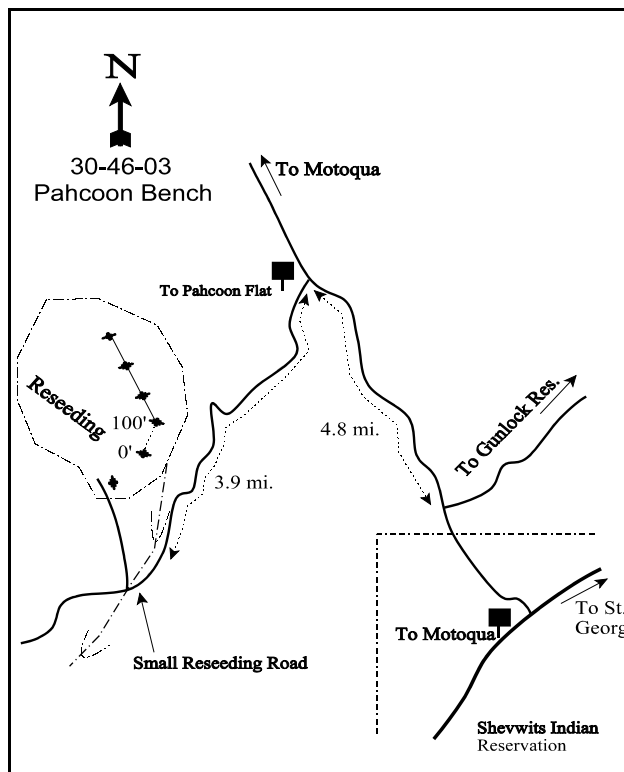
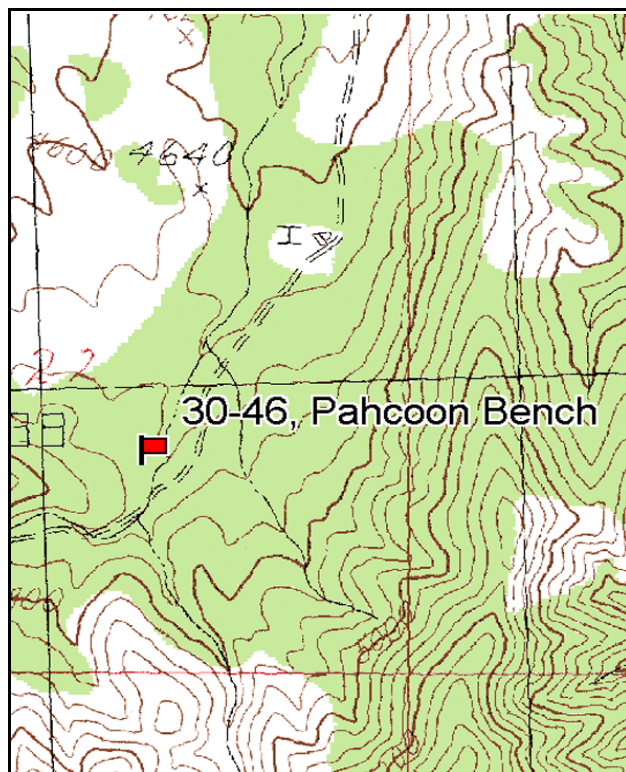
Vegetation type: Burn-Seeding.

Compass bearing: frequency baseline 22 degrees magnetic. (Lines 2-4, 336°M)

Frequency belt placement: line 1 (18 & 96ft), line 2 (57ft), line 3 (20ft), line 4 (73ft). Rebar: Belt 1 on 3ft, belt 5 on 1ft, and belt 4 on 7ft.

LOCATION DESCRIPTION

Proceed past Shivwits approximately 1.0 mile and turn north on the Jackson Springs-Motoqua road. Proceed 4.8 miles on this road past a road to Motoqua to a fork on the left towards Pahcoon Flat. Take the road towards Pahcoon Flat for 3.9 miles, traveling through a seeding. At 3.9 miles, there will be a small, obscure road to the right. Walk 67 paces up the road to the witness post off the east side of the road. The 0-foot baseline stake is 2.5 paces from the witness post at 22 degrees magnetic. The study is marked by green steel "T" fence posts approximately 12 to 18 inches in height. The 0-foot stake is marked by browse tag #471.



Map Name: Shivwits

Diagrammatic Sketch

Township 41S, Range 18W, Section 22

GPS: NAD 27, UTM 12S 4120818 N, 247204 E

DISCUSSION

Pahcoon Bench - Trend Study No. 30-46

This trend study is located on severe winter range on the east side of the Beaver Dam Mountains. It is placed near the south end of Pahcoon Flat on a 1979 chained and seeded pinyon-juniper woodland at an elevation of 4,670 feet. The area is dry, yet has responded well to treatment. Utilization of the area by cattle and wildlife appears light, even with a guzzler nearby. Pellet group data from 1998 estimated 20 deer and 13 cow days use/acre (49 ddu/ha and 32 cdu/ha). Cattle pats appeared to be from the previous fall or winter. The entire area burned sometime in 1999, with only a few juniper trees and shrubs surviving. Deer still use the area and pellet group data from 2003 estimated 25 deer and 8 cow days use/acre (62 ddu/ha and 20 cdu/ha). Cattle pats appeared to be from the previous grazing season (2002).

The soil is relatively shallow and moderately rocky. Effective rooting depth is estimated at just over 10 inches. Soil is hard and compacted. Texture is a loam which is neutral in reaction (pH 7.0). Parent material is limestone, some of which has a white calcium carbonate coating. There has been some signs of erosion in the past, but due to the minimal slope and increase of herbaceous cover since the chaining, it is currently minimal. A shallow drainage channel close to the study site shows signs of stabilization. Overall, protective ground cover has increased from 82% in 1982 to 93% by 1998.

Shrub composition was still developing during the 1998 reading. Key browse species consisted of mountain big sagebrush, with lesser amounts of antelope bitterbrush and Stansbury cliffrose. Sagebrush was well established, but had declined in density from 4,866 plants/acre in 1982, to 3,400 in 1992, and 800 plants/acre by 1998. The number of dead plants can only explain about 10% of the decrease from 1992, therefore the difference is mostly due to the much larger sample size utilized in 1998. The larger sample gives more accurate population estimates for shrubs that have discontinuous and/or clumped distributions. Reproduction has been good in the past with abundant seedlings and young plants sampled in 1982 and 1992. However, recruitment was poor in 1998. Utilization has been light in the past, but some moderate use was reported in 1998. Vigor was normal on most plants and percent decadence low. The wildfire that burned the area in 1999 eliminated most of the mountain big sagebrush on the site. Density was estimated at only 120 plants/acre in 2003, with more than one-half of these being young plants.

Secondary browse species, antelope and desert bitterbrush, are also well established and contained healthy age class structures prior the burn. Individuals were large and vigorous and displayed abundant annual growth in 1992. Utilization of all shrubs appeared light to moderate. During the 1998 reading, all bitterbrush was classified as antelope bitterbrush. There may have been a classification problem between desert bitterbrush and cliffrose in 1982 and 1992. Density of the bitterbrush species was estimated at 732 plants/acre in 1992. This density declined to 60 plants/acre by 1998. Density of cliffrose increased from 66 to 260 plants/acre between 1992 and 1998. There are no dead plants within the population, therefore the changes in density are due to the larger sample size used in 1998 and confusion between desert bitterbrush and cliffrose. The antelope bitterbrush displayed moderate to heavy use in 1998. Vigor was normal, but reproduction limited. Cliffrose increased dramatically in size between 1992 and 1998 according to photo point comparisons. Mature plants averaged 5 feet in height with a crown diameter of 4 feet in 1998. Plants showed moderate to heavy use, yet vigor was good and percent decadence low at 8%. The 1999 wildfire reduced these respective populations. Only 20 cliffrose and 20 bitterbrush plants/acre were estimated in 2003. Some seeded forage kochia was encountered in 2003 at an estimated density of 260 plant/acre.

Threadleaf snakeweed was the most abundant shrub on the site prior to and after the fire. It increased dramatically in density since 1982 when its density was only 466 plants/acre. By 1992, there were an estimated 3,933 young and mature plants/acre, and an additional 7,933 seedlings/acre. During the 1998 reading, density increased 47% to 7,360 plants/acre. Age class distribution indicated a stable population with 97% of the plants being mature. After the fire, density was estimated at an incredible 17,600 plants/acre in

2003. They totally dominate the shrub composition by providing 93% of the total shrub cover. Juniper trees were also found on the site in small numbers prior the fire. Point-quarter data from 1998 estimated 90 juniper trees/acre with an average basal diameter of 3.3 inches. Of these trees, 21% were larger, tipped over trees that were still alive since the chaining. Average basal diameter of these trees was 7 inches. All juniper trees were killed by the fire which burned the area in 1999.

Seeded grasses, crested and intermediate wheatgrass, had been fairly successful and appeared to be increasing in 1982. However, quadrat frequencies of perennial grasses remained stable by 1992, then declined in 1998. The annuals, cheatgrass and foxtail brome, were both quite common and have persisted even as perennials become more firmly established. It was noted in the 1982 report that these annual grasses were expected to decline as seeded grasses became established. On examination of photos taken during both readings, it appeared that the opposite was true. Cheatgrass appeared to have increased in abundance creating a fire hazard on this site. These annuals accounted for 89% of the grass cover in 1998. After the 1999 wildfire, abundance of perennial grasses has declined and dominance of annual grasses has increased. Very little crested and intermediate wheatgrass remains on the site.

The forb composition is deficient with all species providing only 2% cover in 1998. The only forb included in the chaining seed mixture was yellow sweetclover which is a short-lived perennial. No sweet clover was encountered during any reading. Annual forbs such as *Draba*, storksbill, and *Microsteris gracilis*, dominated the forb composition in 1998 by producing 95% of the forb cover. After the fire, these same annuals still provide nearly all of the forb cover. The most prominent perennial species prior to and after the 1999 wildfire is gooseberryleaf globemallow.

1982 APPARENT TREND ASSESSMENT

Soil trend appears to be improving due to the seeding effort. Vegetational trend parameters indicate a rapidly expanding sagebrush population and fairly static populations of secondary shrubs. Increaser shrubs are present, but not currently abundant. A fair to good grass cover appears to be thickening. Although, forbs are almost nonexistent and unless inter-seeded, will never be an important vegetation component.

1992 TREND ASSESSMENT

Soil conditions have improved. Basal vegetative cover increased by nearly fourfold, while bare ground declined by 30%. The browse trend is mixed. Mountain big sagebrush has decreased slightly in density. No young plants were encountered, but abundant seedlings were counted. Secondary species have healthy populations, good vigor, and adequate reproductive potentials. On the down side, threadleaf snakeweed has increased dramatically and is currently the most numerous shrub with an estimated density of 3,933 plants/acre. Age class structure indicates possible further increases. Overall, the browse trend is stable. Herbaceous plants are dominated by seeded grasses and cheatgrass brome. Quadrat frequencies of perennial grasses have not changed since 1982, while cheatgrass appears to have increased creating a fire hazard on this site. Forbs are severely deficient. Only one perennial forb, gooseberryleaf globemallow, was encountered either year. Trend for herbaceous understory is therefore stable and very poor condition.

TREND ASSESSMENT

soil - up (5)

browse - stable (3)

herbaceous understory - stable but poor (3)

1998 TREND ASSESSMENT

Trend for soil appears stable with similar ground cover characteristics compared to 1992. Litter cover declined from 71% to 56%, possibly due to classifying dried up cheatgrass as litter in 1982 and 1992. Percent

bare ground remained similar. Trend for the key browse species, mountain big sagebrush, cliffrose, and bitterbrush, is mixed. Sagebrush density is declining, with cliffrose and bitterbrush appearing stable. There appears to have been an identification problem with desert bitterbrush and cliffrose in the past. Utilization of all shrubs has increased since 1992, but vigor remains normal and percent decadence low. Some of the changes in density are also due to the larger sample used in 1998. Overall, the browse trend is considered down slightly. Trend for the herbaceous understory is down and in poor condition due to the dominance of annual cheatgrass and foxtail brome. Sum of nested frequency for perennial grasses has declined. Frequency of perennial forbs increased slightly, although forbs are still scarce. Nested frequency for intermediate wheatgrass declined significantly.

TREND ASSESSMENT

soil - stable (3)

browse - down slightly (2)

herbaceous understory - down and in poor condition (1)

2003 TREND ASSESSMENT

A wildfire, which burned the site in 1999, has caused downward trends in all categories. Soil trend is down slightly. Cover of bare ground is still relatively low yet it has nearly doubled while litter and vegetation cover have declined. There is not a problem with erosion however, due to the gentle terrain and abundance of annual grass and forb cover. Trend for browse is down with the most preferred species nearly being eliminated by fire. Only 120 sagebrush, 20 cliffrose, and 20 bitterbrush plants/acre were estimated in 2003. The invasive increaser, threadleaf snakeweed, has increased dramatically to 17,600 plants/acre. It now provides 93% of the total shrub cover. The only positive aspect of the shrub trend is the appearance of some prostate kochia that was seeded after the fire. Trend for the herbaceous understory is also down. Sum of nested frequency for perennial grasses declined and there are few perennial grasses left on the site. Annuals, cheatgrass and foxtail brome totally dominate the grass composition by providing 94% of the grass cover. Annual forbs dominate the forb composition, especially storksbill which provides 83% of the forb cover. The only fairly common perennial forb remains gooseberryleaf globemallow. This area burned again in July of 2003 as part of the Apex fire. This increase in the burn frequency will only push the community more toward an annual dominated type and completely destroy the areas usefulness as deer winter range.

TREND ASSESSMENT

soil - down slightly (2)

browse - down (1)

herbaceous understory - down (1)

HERBACEOUS TRENDS --

Management unit 30 , Study no: 46

Type	Species	Nested Frequency			Average Cover %	
		'92	'98	'03	'98	'03
G	Agropyron cristatum	_b 44	_b 52	_a -	1.23	.00
G	Agropyron intermedium	_c 136	_b 79	_a 2	1.89	.15
G	Bromus rubens (a)	-	_b 169	_a 113	4.65	1.62
G	Bromus tectorum (a)	-	_b 366	_a 304	29.75	13.42
G	Elymus junceus	3	-	-	-	-

T y p e	Species	Nested Frequency			Average Cover %	
		'92	'98	'03	'98	'03
G	<i>Poa pratensis</i>	4	-	-	-	-
G	<i>Poa secunda</i>	-	4	9	.01	.04
G	<i>Sitanion hystrix</i>	-	1	-	.00	-
G	<i>Sporobolus cryptandrus</i>	4	-	-	-	.00
G	<i>Vulpia octoflora</i> (a)	-	94	104	1.13	.80
Total for Annual Grasses		0	629	521	35.54	15.85
Total for Perennial Grasses		191	136	11	3.14	0.20
Total for Grasses		191	765	532	38.68	16.05
F	<i>Alyssum alyssoides</i> (a)	-	-	5	-	.01
F	<i>Allium</i> spp.	-	2	-	.01	-
F	<i>Astragalus</i> spp.	-	2	-	.01	-
F	<i>Calochortus nuttallii</i>	-	7	3	.01	.00
F	<i>Chenopodium fremontii</i> (a)	-	-	11	-	.02
F	<i>Descurainia pinnata</i> (a)	-	7	3	.01	.00
F	<i>Draba</i> spp. (a)	-	_b 102	_a 9	.31	.03
F	<i>Erodium cicutarium</i> (a)	-	_a 28	_b 185	.73	13.87
F	<i>Gilia</i> spp. (a)	-	3	-	.00	-
F	<i>Lactuca serriola</i>	-	-	3	-	.03
F	<i>Lychnis drummondii</i>	_a -	_b 8	_a -	.05	-
F	<i>Microsteris gracilis</i> (a)	-	_b 154	_a 8	.64	.02
F	<i>Navarretia intertexta</i> (a)	-	-	3	-	.01
F	<i>Plantago patagonica</i> (a)	-	28	29	.13	.21
F	<i>Sisymbrium altissimum</i> (a)	-	_a -	_b 20	-	1.46
F	<i>Sphaeralcea grossulariaefolia</i>	_a 4	_a 3	_b 60	.00	.97
Total for Annual Forbs		0	322	273	1.83	15.64
Total for Perennial Forbs		4	22	66	0.08	1.01
Total for Forbs		4	344	339	1.92	16.65

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --

Management unit 30 , Study no: 46

Type	Species	Strip Frequency		Average Cover %	
		'98	'03	'98	'03
B	<i>Artemisia tridentata vaseyana</i>	26	6	4.31	.03
B	<i>Chrysothamnus nauseosus hololeucus</i>	0	0	.15	-
B	<i>Cowania mexicana stansburiana</i>	12	1	1.52	-
B	<i>Ephedra viridis</i>	1	0	.63	-
B	<i>Gutierrezia microrcephala</i>	69	86	6.17	11.85
B	<i>Juniperus osteosperma</i>	7	0	2.75	-
B	<i>Kochia prostrata</i>	0	10	-	.34
B	<i>Opuntia</i> spp.	3	0	.00	-
B	<i>Prunus fasciculata</i>	5	5	-	.39
B	<i>Purshia tridentata</i>	3	1	1.48	.15
Total for Browse		126	109	17.03	12.76

CANOPY COVER, LINE INTERCEPT --

Management unit 30 , Study no: 46

Species	Percent Cover	
	'98	'03
<i>Cowania mexicana stansburiana</i>	.80	-
<i>Gutierrezia microrcephala</i>	-	14.85
<i>Juniperus osteosperma</i>	3.20	-
<i>Kochia prostrata</i>	-	.60
<i>Pinus monophylla</i>	.20	-
<i>Prunus fasciculata</i>	-	.83

BASIC COVER --

Management unit 30 , Study no: 46

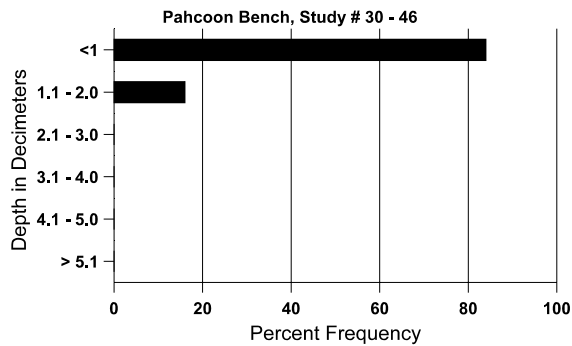
Cover Type	Average Cover %		
	'92	'98	'03
Vegetation	5.50	53.28	48.50
Rock	7.25	10.22	11.40
Pavement	8.50	9.86	7.26
Litter	70.50	55.49	31.16
Cryptogams	0	1.21	.03
Bare Ground	8.25	7.42	13.06

SOIL ANALYSIS DATA --

Management unit 30, Study no: 46, Study Name: Pahcoon Bench

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m
10.3	71.6 (10.4)	7.0	48.0	33.4	18.6	2.6	12.6	108.8	0.8

Stoniness Index



PELLET GROUP DATA --

Management unit 30 , Study no: 46

Type	Quadrat Frequency		Days use per acre (ha)	
	'98	'03	'98	'03
Rabbit	34	10	-	-
Deer	33	20	19 (47)	25 (63)
Cattle	3	2	13 (32)	8 (20)

BROWSE CHARACTERISTICS --

Management unit 30 , Study no: 46

		Age class distribution (plants per acre)					Utilization				
Y	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
Artemisia tridentata vaseyana											
82	4866	733	3333	1533	-	-	0	0	0	0	25/19
92	3400	6933	-	3200	200	-	0	0	6	0	28/28
98	800	-	20	660	120	280	20	0	15	3	28/36
03	120	20	80	40	-	-	0	17	0	0	17/15
Cowania mexicana stansburiana											
82	66	-	-	66	-	-	0	0	0	0	28/28
92	66	-	-	66	-	-	0	0	0	0	57/44
98	260	100	-	240	20	20	31	15	8	0	61/52
03	20	-	-	-	20	580	0	0	100	0	26/23

		Age class distribution (plants per acre)					Utilization				
Y e a r	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
<i>Ephedra viridis</i>											
82	0	-	-	-	-	-	0	0	-	0	-/-
92	0	-	-	-	-	-	0	0	-	0	-/-
98	20	-	-	20	-	-	100	0	-	0	30/38
03	0	-	-	-	-	-	0	0	-	0	25/48
<i>Gutierrezia microrcephala</i>											
82	466	-	-	466	-	-	0	0	0	0	13/11
92	3933	7933	200	3733	-	-	0	0	0	0	14/15
98	7360	80	160	7120	80	80	0	0	1	1	9/12
03	17600	80	1980	15180	440	1020	0	0	3	1	12/13
<i>Juniperus osteosperma</i>											
82	0	66	-	-	-	-	0	0	-	0	-/-
92	66	-	66	-	-	-	0	0	-	0	-/-
98	140	20	80	60	-	-	0	0	-	0	-/-
03	0	-	-	-	-	40	0	0	-	0	-/-
<i>Kochia prostrata</i>											
82	0	-	-	-	-	-	0	0	-	0	-/-
92	0	-	-	-	-	-	0	0	-	0	-/-
98	0	-	-	-	-	-	0	0	-	0	-/-
03	260	40	80	180	-	-	0	0	-	0	10/15
<i>Opuntia</i> spp.											
82	0	-	-	-	-	-	0	0	-	0	-/-
92	0	-	-	-	-	-	0	0	-	0	-/-
98	60	-	20	40	-	-	0	0	-	0	8/20
03	0	-	-	-	-	-	0	0	-	0	8/18
<i>Prunus fasciculata</i>											
82	0	-	-	-	-	-	0	0	0	0	-/-
92	0	-	-	-	-	-	0	0	0	0	-/-
98	100	-	20	60	20	-	0	0	20	20	51/72
03	100	-	-	100	-	-	20	0	0	20	39/56
<i>Purshia glandulosa</i>											
82	266	-	200	66	-	-	25	0	-	0	32/44
92	266	-	266	-	-	-	0	0	-	0	-/-
98	0	-	-	-	-	-	0	0	-	0	-/-
03	0	-	-	-	-	-	0	0	-	0	-/-

		Age class distribution (plants per acre)					Utilization				
Y e a r	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
Purshia tridentata											
82	0	-	-	-	-	-	0	0	0	0	-/-
92	466	66	66	400	-	-	29	0	0	0	34/50
98	60	60	-	60	-	-	33	67	0	0	47/71
03	20	-	-	-	20	-	100	0	100	0	44/38
Quercus turbinella											
82	0	-	-	-	-	-	0	0	-	0	-/-
92	0	-	-	-	-	-	0	0	-	0	-/-
98	0	20	-	-	-	-	0	0	-	0	-/-
03	0	-	-	-	-	-	0	0	-	0	-/-
Yucca baccata baccata											
82	133	-	-	133	-	-	50	0	-	0	7/10
92	200	-	200	-	-	-	0	0	-	0	-/-
98	0	-	-	-	-	-	0	0	-	0	-/-
03	0	-	-	-	-	-	0	0	-	0	-/-